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18P

SMM UV OBSERVATIONS OF ACTIVE REGION 5395

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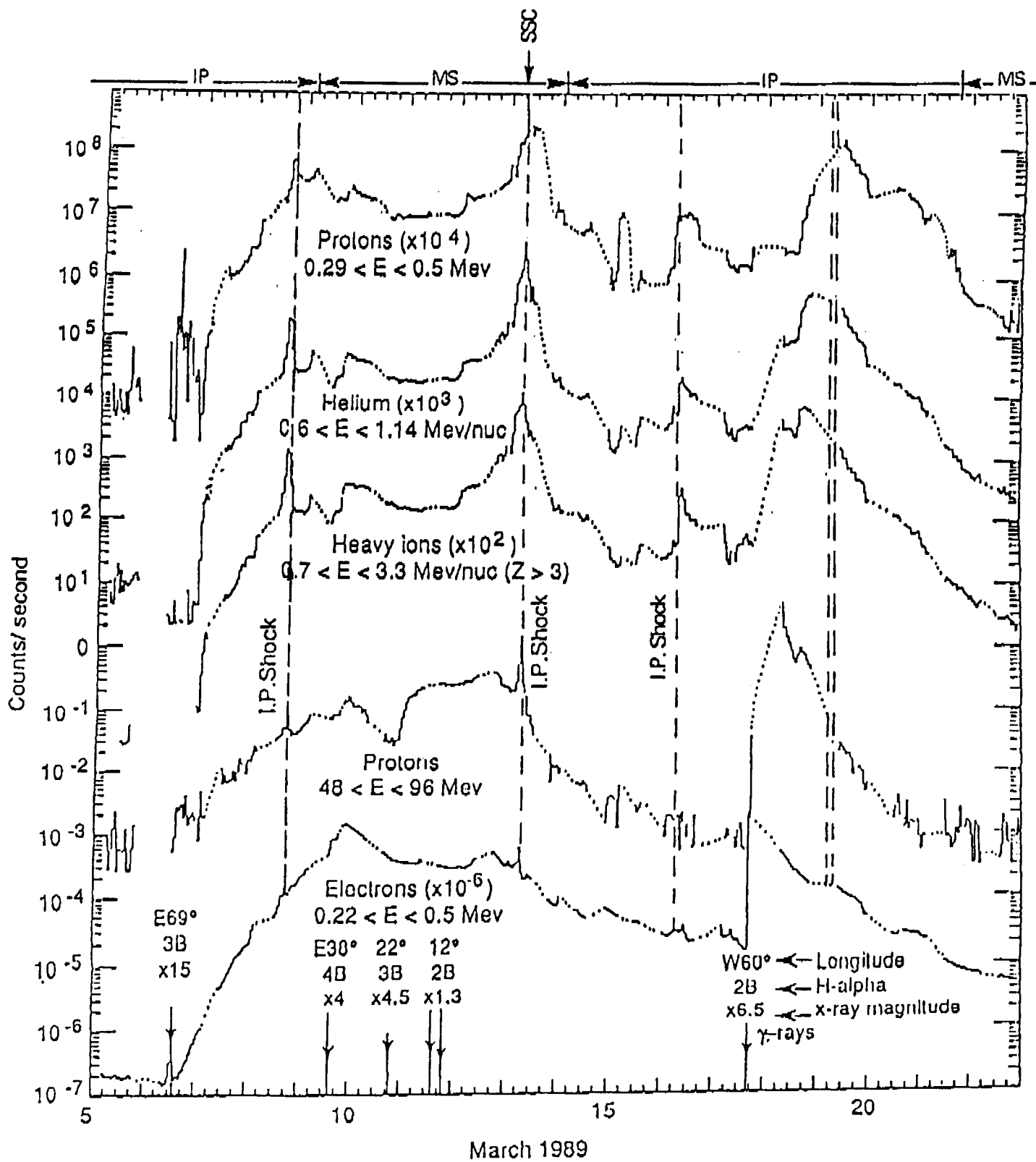
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ABSTRACT

The Ultraviolet Spectrometer and Polarimeter (UVSP) on the *Solar Maximum Mission* (SMM) spacecraft has been used extensively to study the spatial morphology and time variability of solar active regions in the far UV (at $\sim \lambda 1370 \text{ \AA}$) since July 1985. The normal spatial resolution of UVSP observations in this 2nd-order mode is $10''$, and the highest temporal resolution is 64 milliseconds. To make a full-field, $4' \times 4'$ image this wavelength using $5''$ raster steps takes about 3 minutes. UVSP can also make observations of the Sun at $\sim \lambda 2790$ with $3''$ spatial resolution when operated in its 1st-order mode; a full-field image at this wavelength (a so-called SNEW image) takes about 8 minutes.

UVSP made thousands of observations (mostly in 2nd-order) of AR 5395 during its transit across the visible solar hemisphere (from 7 to 19 March, inclusive). During this period, UVSP's duty cycle for observing AR 5395 was roughly 40%, with the remaining 60% of the time being fairly evenly divided between aeronomy studies of the Earth's atmosphere and dead time due to Earth occultation of the Sun. UVSP observed many of the flares tagged to AR 5395, including 26 GOES M-level flares and 3 X-level flares, one of which produced so much UV emission that the safety software of UVSP turned off the detector to avoid damage due to saturation. (See Table 1 for list of the UVSP experiments corresponding to these strong X-ray flares.) We present images and light curves of some of the more spectacular of the AR 5395 events (See Table 2 and Figures).

All of the UVSP AR 5395 data are available from the authors upon request.



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Table 1

M and X-class GOES flares from AR 5395 observed by UVSP

| Date | GOES level | GOES t_{max} (UT) | UVSP Max. Counts $(0.056 \text{ s})^{-1}$ | UVSP t_{max} (UT) |
|----------|------------|---------------------|---|---------------------|
| 07 March | M2.0 | 06:00 | 6762 | 05:58 |
| | M4.1 | 13:26 | 10855 | <13:25 |
| | M2.4 | 13:44 | 3620 | <13:42 |
| | X1.8 | 14:58 | 43775 | <14:58 |
| | M3.8 | 16:56 | 10961 | 17:00 |
| | M4.2 | 22:38 | 12745 | <22:45 |
| 08 March | M2.1 | 08:33 | 2271 | 08:30 |
| | M4.6 | 18:57 | 6681 | <18:57 |
| 09 March | M1.8 | 02:46 | 11276 | <02:44 |
| | M1.3 | 23:20 | 4177 | 23:19 |
| 10 March | X4.5 | 19:22 | >59310* | >19:12 |
| 11 March | M1.6 | 01:56 | 4538 | <01:46 |
| | M2.0 | 03:34 | 13056 | 03:42 |
| | M1.2 | 06:50 | 2700 | <06:45 |
| | M1.2 | 18:36 | 4129 | 18:35 |
| | M1.1 | 23:18 | 4396 | <23:11 |
| 12 March | M2.5 | 15:10 | 4587 | 15:11 |
| | M1.8 | 16:24 | 10276 | 16:22 |
| | M6.3 | 21:03 | 4964 | 21:01 |
| 13 March | M1.4 | 01:37 | 2686 | <01:38 |
| | X1.2 | 03:26 | 5935 | <03:25 |
| 14 March | M2.0 | 03:05 | 2094 | 03:01 |
| 15 March | M4.8 | 06:52 | 13673 | 06:47 |
| | M4.2 | 08:39 | 2541 | 08:27 |
| 16 March | M1.4 | 19:01 | 7510 | 18:54 |
| 17 March | M2.5 | 02:47 | 14359 | 02:45 |
| 18 March | M3.3 | 20:35 | 893 | 20:31 |
| | M3.1 | 22:05 | 1380 | 21:57 |
| 19 March | M1.3 | 07:49 | 1118 | 07:38 |

* Detectors shut down when count rate exceeded 10^6 s^{-1}

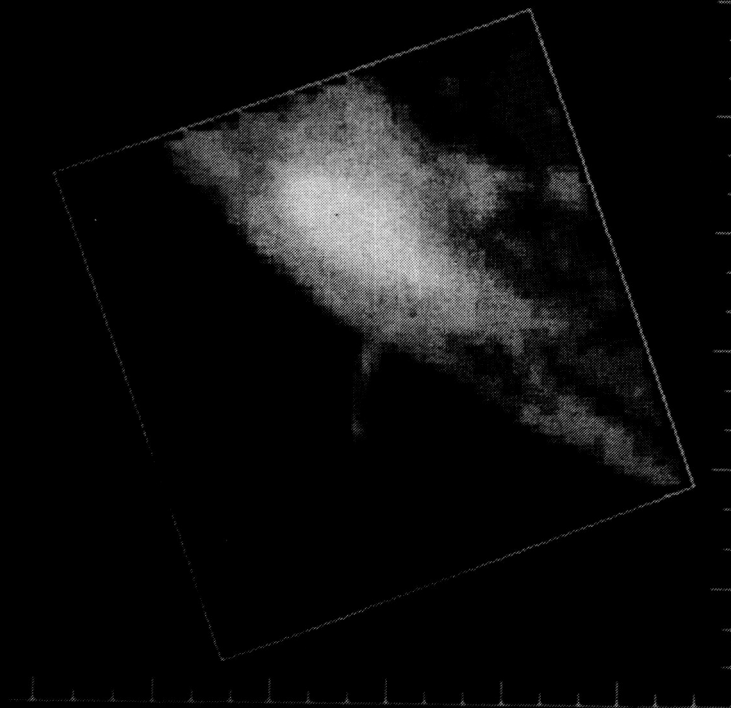
Table 2

Highlights of UVSP-SMM Observations of AR 5395
6 - 20 March 1989

| Date | Time (UT) | Expt. No. | Type | Max.* | Comments |
|----------|----------------------------|----------------|--------------------|----------------|------------------|
| 6 March | 0921 - 1002 | 85125 | SNEW | 1st order | Spot group |
| 7 March | 1325 - 1338 | 85209 | BPFIND | 10855 | M4.1 at 1326 |
| 7 March | 1455 - 1458 | 85216 | raster | 43775 | X1.8 at 1458 |
| 8 March | 1853 - 1857 | 85302 | raster | 24057 | M4.0 at 1857 |
| 10 March | 1907 - 1910 1911 - 1913 | 85489 85491 | raster TINYRAST | 35413 59310 | X4.5 at 1922 |
| 11 March | 0915 - 0951 | 85557 | SNEW | 1st order | 1st order flare |
| 19 March | 0733 - 0747 | 86230 | BPFINDWL | 1118 | Post-flare loops |

* Counts per 0.056 s

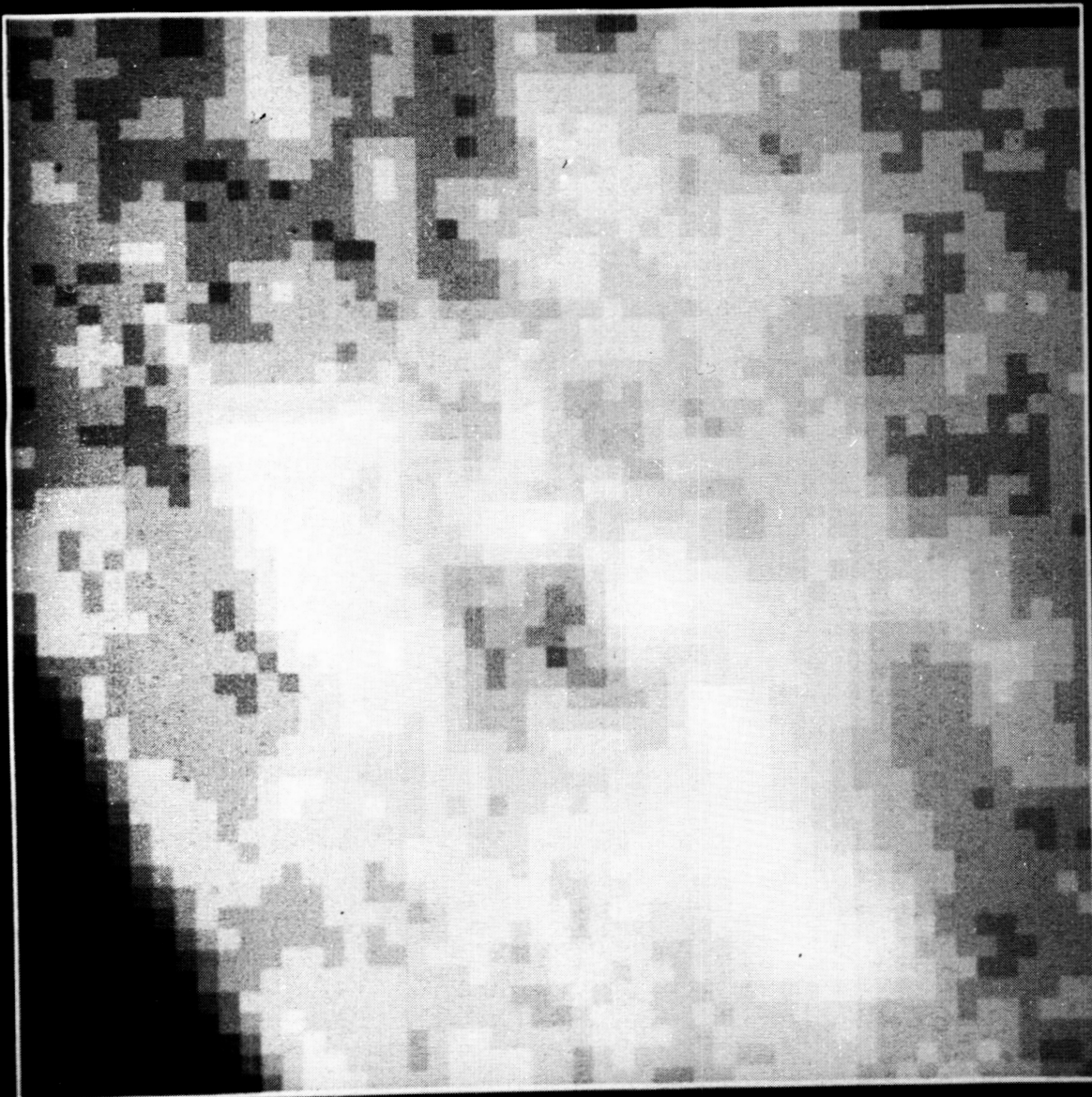
Expt. 85216 (+0) Slit 1
 1989 Mar. 7 (DOY 66) 14:54:52 UT
 Detector 1



Max., avg. counts = 43775, 109
 AR 5395 on NE limb: X1.8
 Each division = 20 arc sec

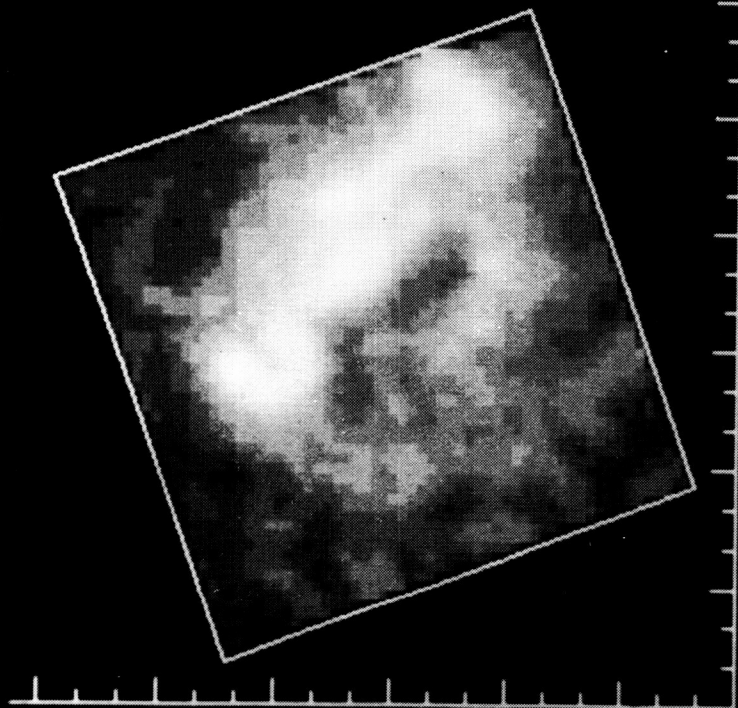
1 4 16 64 256 1024 4096 16384





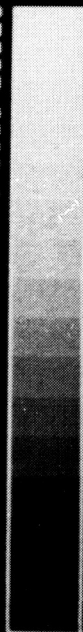
UVSP Expt. 85302 1853-1856 UT 8 Mar 1989

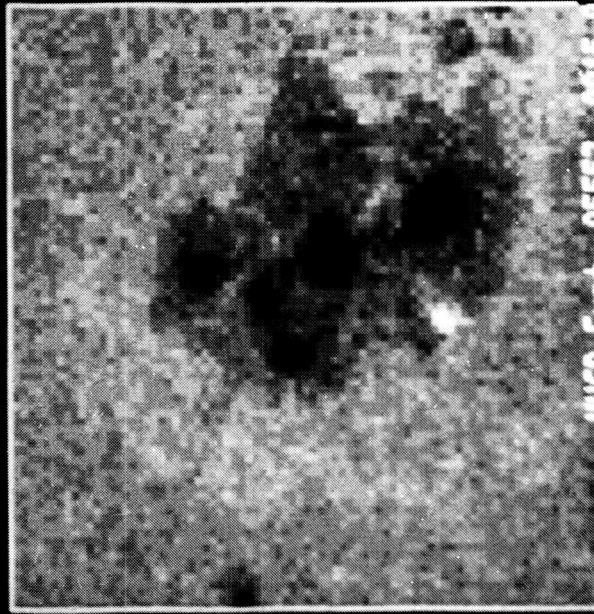
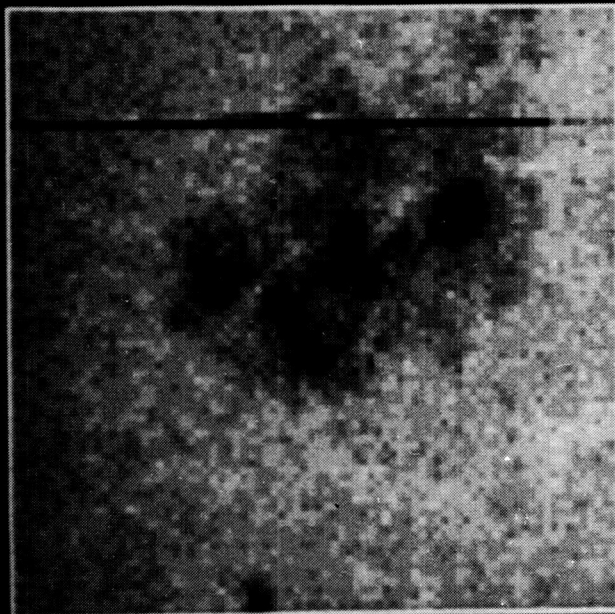
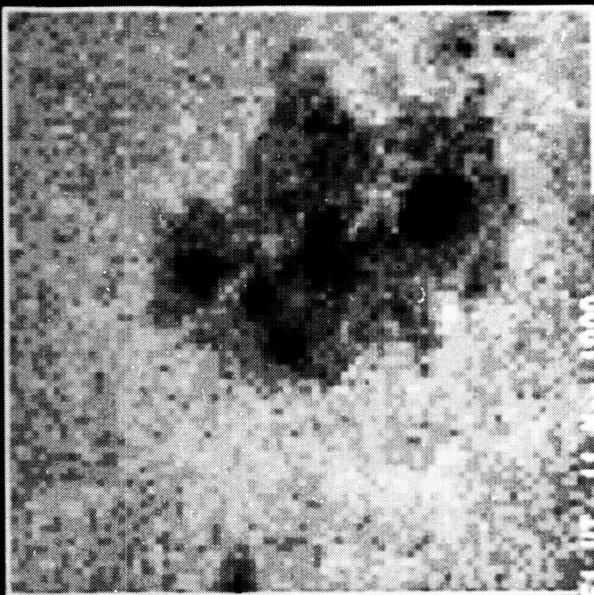
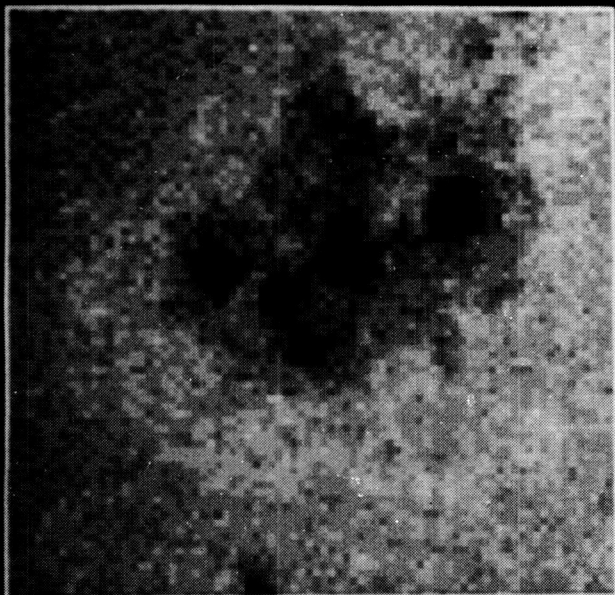
Expt. 85489 (+0) Slit 1
 1989 Mar. 10 (DOY 69) 19:07:39 UT
 Detector 1



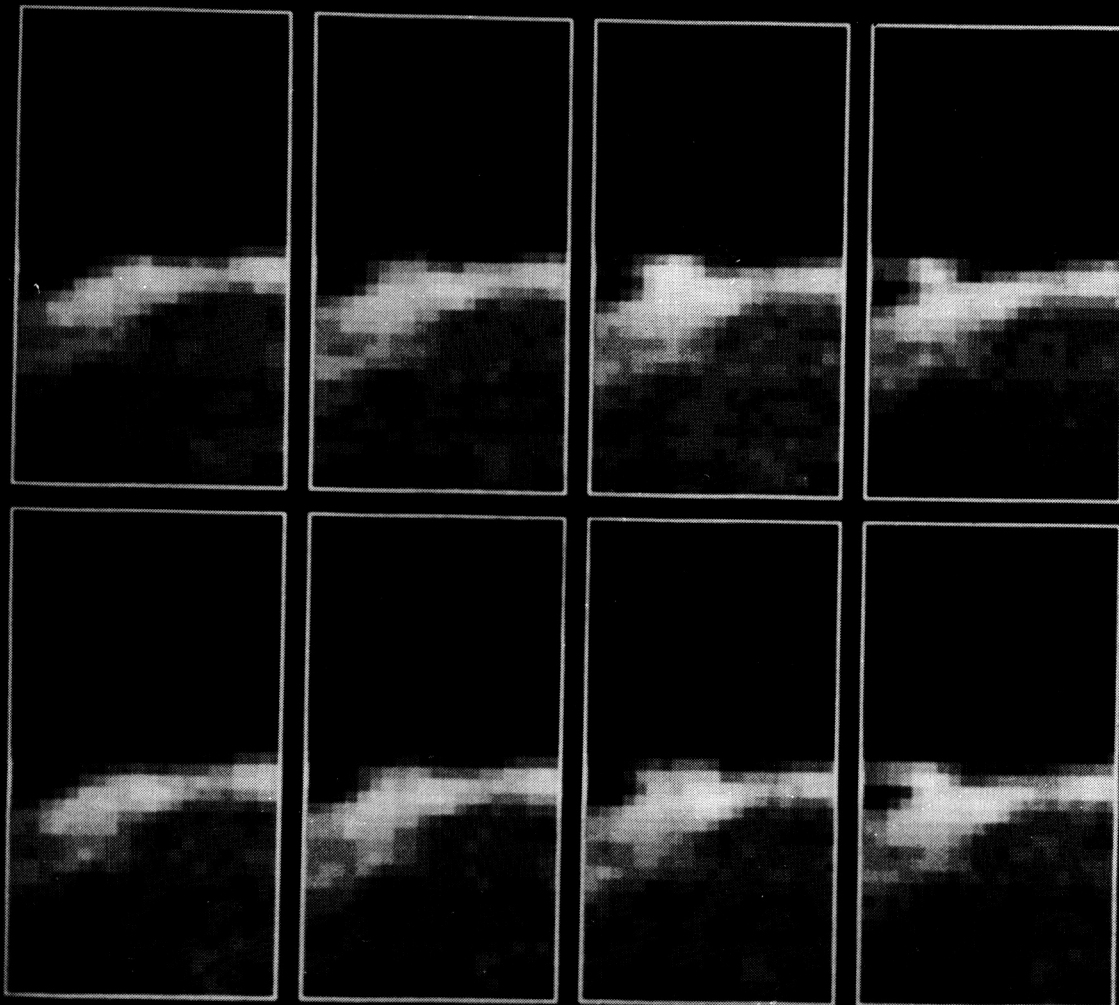
Max., avg. counts = 35413, 263
 X4.5 flare from Active Region: 5395
 Each division = 20 arc sec

1 4 16 64 256 1024 4096 16384





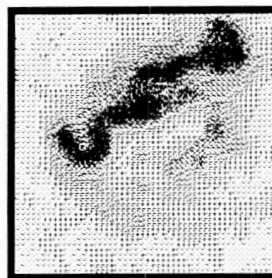
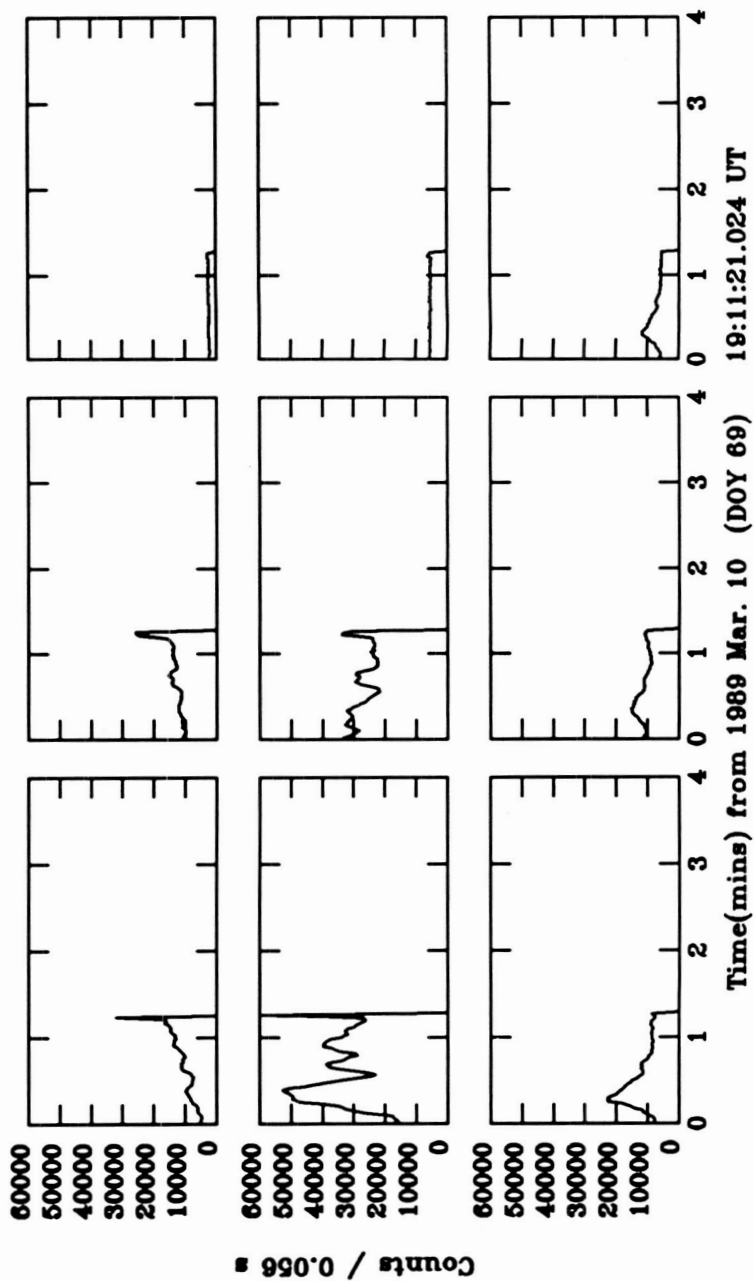
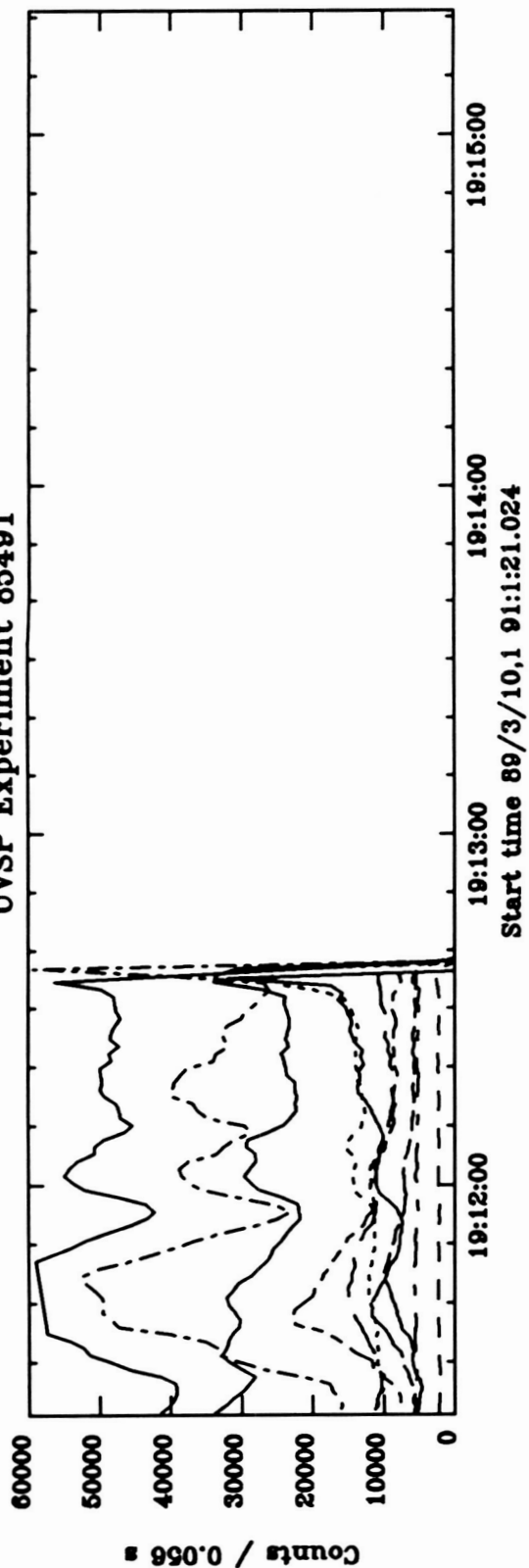
UVSP Expt. 85557 0515-0951 UT 11 Mar 1989



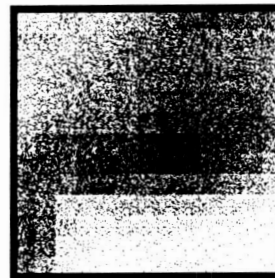
UVSP Expt. 86230 0733-0747 UT 19 Mar 1989

C-4

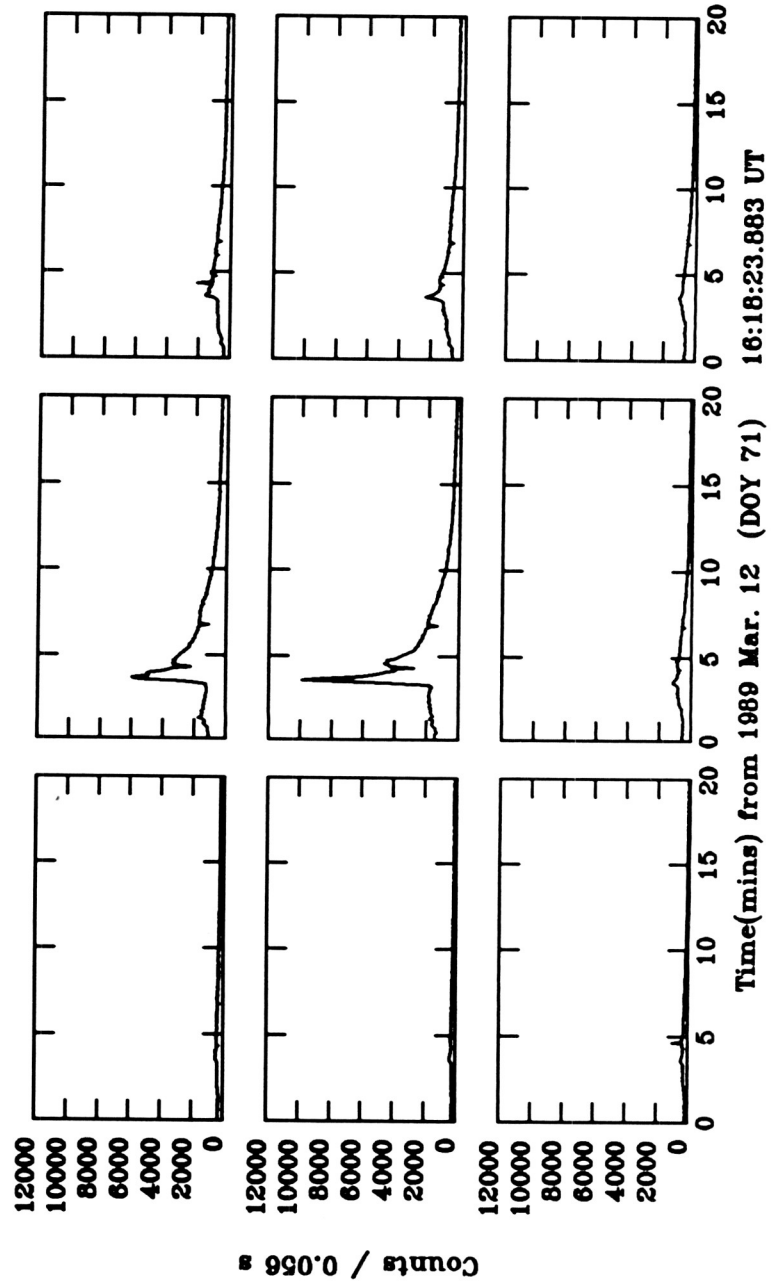
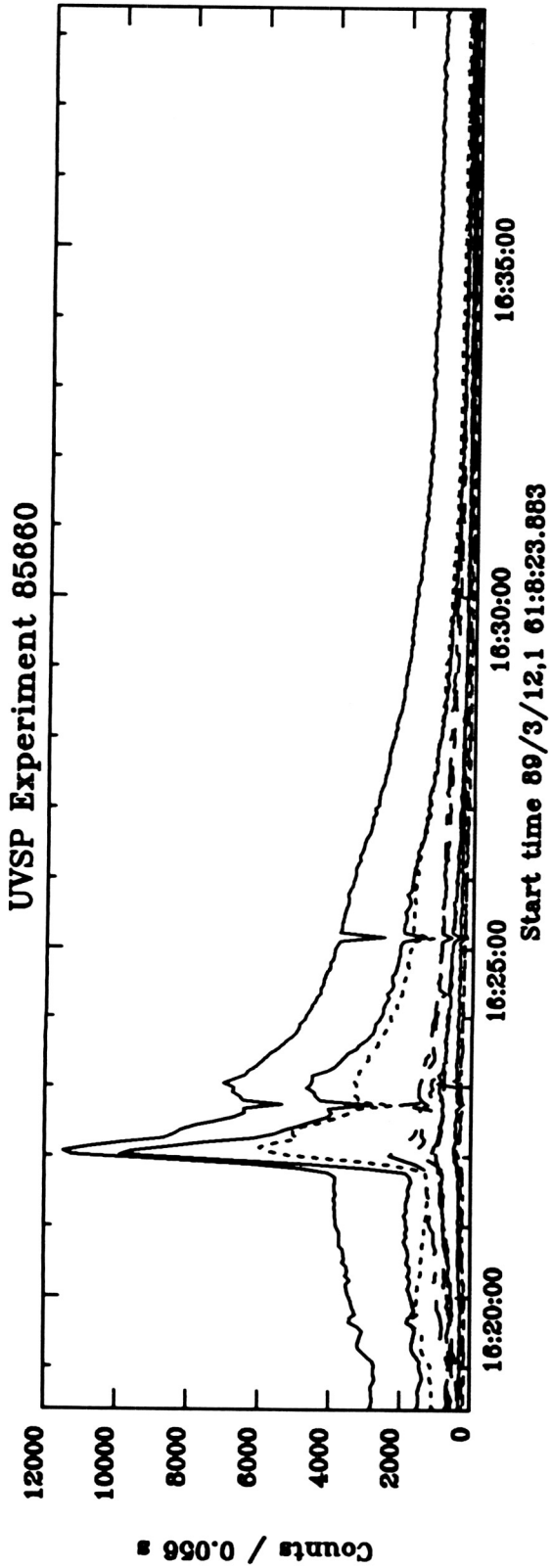
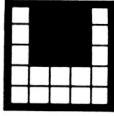
UVSP Experiment 85491



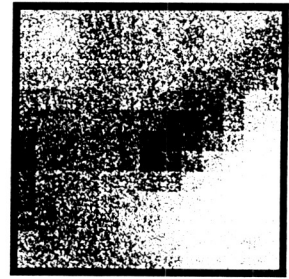
U85489 (52 x 52)



U85490 (13 x 13)

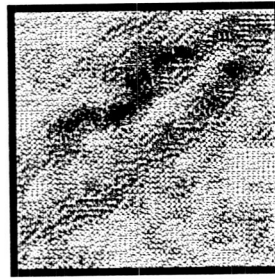
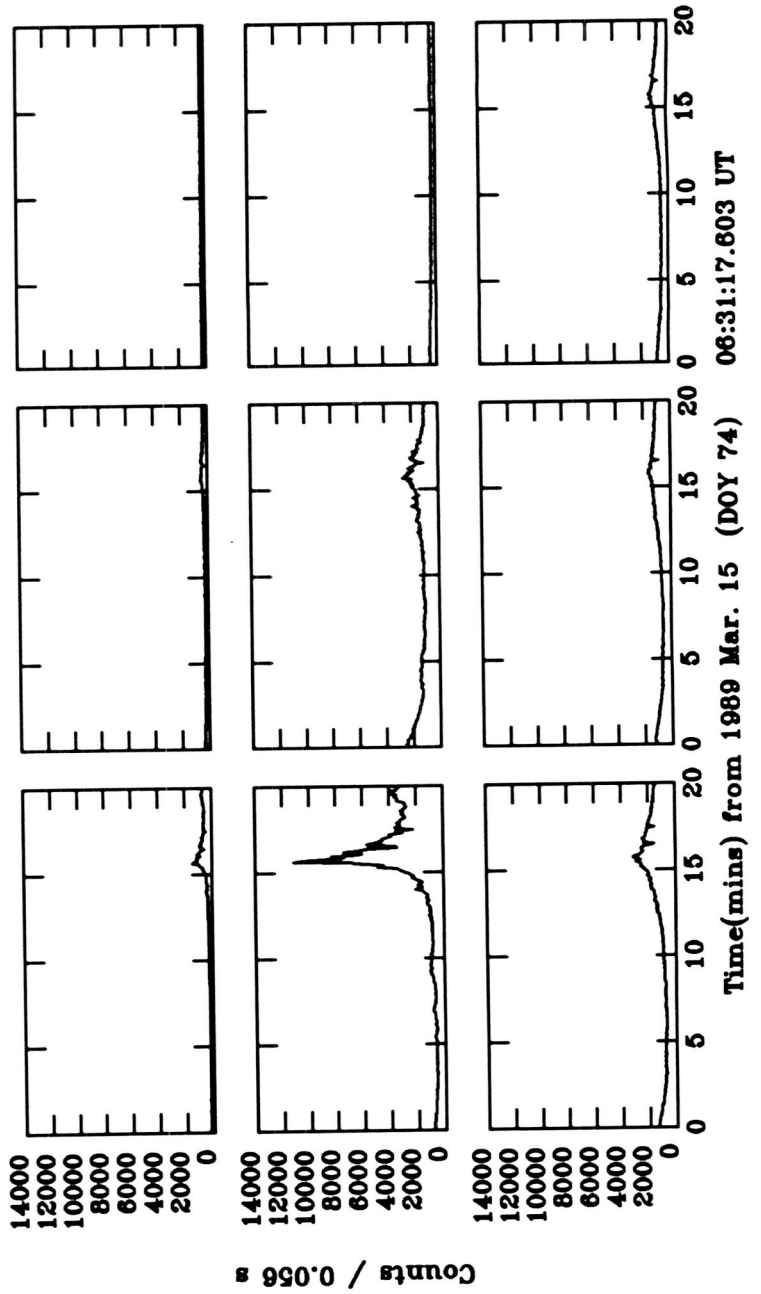
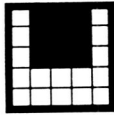
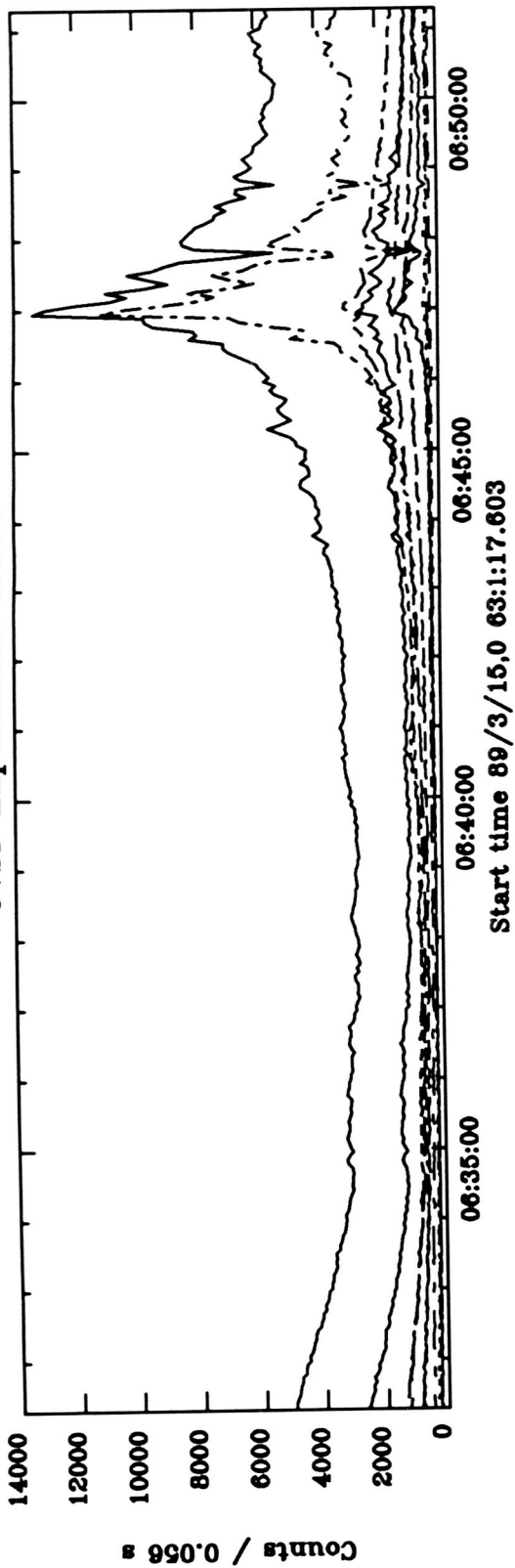


U85658 (52 x 52)



U85659 (13 x 13)

UVSP Experiment 85894



U85892 (52 x 52)



U85893 (13 x 13)